UNIVERSITY OF CALIFORNIA.

AGRICULTURAL EXPERIMENT STATION.

BERKELEY, CAL.

E. W. HILGARD, Director.

BULLETIN NO. 95.

DISTRIBUTION OF SEEDS AND PLANTS.

The report of this Station for 1890, which is now in press, contains interesting tabulated statements concerning our distributions of seeds, plants, etc., during the years 1886–1891 inclusive. The following is a condensation of gross amounts of material distributed:

	Nos. of plants and cuttings.	Ounces of seed.
1886–7	5,375	3,112
1887–8	5,815	6,474
1888–9	11 140	8,125
1889–0	3,959	5,669
1890–1	11,189	6,614
Totals for five years	37,478	29,993

The distribution of plants and cuttings included 26 species and of seeds 37 species, including a much larger number of varieties. The total number of individual applications received during the five years was 3023, and material was mailed to 1362 postoffices and sent to 688 express offices. Each year almost every county in the State was included in the distribution. Another table in the Report presents the financial showing for the five years, and credits applicants with sending remittance s ranging per year from $291.70 to $561.64 as extremes. These amounts have not in any year quite equaled the cost of distribution, the small balance being supplied from the Station funds. This fact is not objectionable, for the work is very satisfactory in its results. Experience proves, however, that requiring a small contribution insures the applicant's interest and relieves us from the profitless work of supplying the throng of people who always carelessly send for what costs them nothing, and who, as a rule, give no attention to the trial of the material sent them, and therefore do not report results. Our distribution contemplates the acceptance of an obligation by the applicant to faithfully experiment with the material supplied and to report success or failure. That this obligation is conscientiously discharged by a large proportion of our correspondents is shown by the full data credited to such sources in our Report for 1890. This distribution from the Station is for the purpose of securing wide trial of growths new to the State, and does not include common trees, plants and seeds which can be had from dealers. For this reason we do not invite applications for general supplies of garden seeds. We cannot furnish them.

Terms.—To meet the expenses of packing and postage, applicants are requested to send the amount specified in connection with each description below. If they desire seeds sent by express, applicants need not send the amounts specified for postage, *but all orders for* SEEDS *by express* must be accompanied by a remittance of 25 cents to pay for packing. Applications may be made for one or more kinds of seeds, *but an applicant should not order more than one package of a kind.* In case any kind of seed becomes exhausted, the money sent will be returned, unless a second choice is mentioned by the sender. Postal notes are requested instead of stamps whenever practicable. Any surplus left after filling orders will, as far as possi-

ble, be returned to the senders, deducting letter postage.

ESCULENT ROOTS AND TUBERS.

The manifest disposition among our correspondents to try locally several plants which are prominent sources of food for men and animals in other sub-tropical climates, induces us to offer the following, without, however, in all cases guaranteeing their fitness for California conditions:

CASSAVA (*Manihot aipi*).—This plant (sweet cassava) has recently been especially inquired about by Californians who have heard or read of its commendation by those who use it for human food or for cattle in the Gulf States. Through the courtesy of Dr. W. C. Stubbs of the Louisiana Sugar Experiment Station, we have secured a supply of the stems, by which the plant is readily propagated. Cassava is chiefly grown in the West Indies and tropical America, and in Florida and Louisiana. As California conditions are quite in contrast with those prevailing in these moist regions, it is not wise to forecast wide success for the plant in this State. It is quite possible, however, that it may prove satisfactory in some situations. It is commended in Florida as a kitchen vegetable used as potatoes are; also the grated root is used for bread, puddings. etc. For cow-feed both the leaves and roots are used, the latter being described as far better than sweet potatoes as a milch feed. The fleshy roots grow to a length of three or four feet, and are readily pulled out of the loose soil, which is best suited to its growth. The roots must be pulled only as desired for feeding, and the supply is continuous the year round. It is estimated that from ten to fifty tons can be grown to the acre. The plant is most readily propagated by stem cuttings, which are made about six inches long; the cuttings placed four feet apart each way and wholly buried in the soil to a depth of three or four inches. In the South, it is usual to give but little cultivation, except hoeing to keep down weeds until the plants get a good start. In this State, summer cultivation may be necessary to retain moisture. In locations free from frost, and where the soil is well drained and warm enough to admit of planting of tender vegetables during the winter, the cassava cuttings may be planted as described above as soon as received. Where there is danger of frost or likelihood of cold, water-soaked ground for some time, the cuttings should be stored in *damp* sand and planted out when the soil is in good condition in the spring. We will send a package of cuttings by mail for 10c.

TARO (*Colocasia esculenta*).—This plant, which will be recognized by most readers as a leading food supply of the natives of the Hawaiian and other Pacific islands, is grown here and there throughout California as an ornamental plant. Recent experience reported from San Diego Co. creates a presumption that in some localities in California, taro may become of economic importance. The tuber or corm is highly palatable and nutritious either boiled, baked or made into bread. The leaves are also said to be palatable cooked as spinach, Thorough cooking is necessary with both leaves and roots to rid them of acridity and poisonous principles. Taro may be grown in ordinary garden soil and with garden culture, or it may be planted along the sides of streams or in marshy places. It will endure complete submergence of the roots, and is sometimes grown on beds artificially flooded. Quicker and larger growth of the corm may be expected in the moister situations. Heavy frost cuts the leaves to the ground, but does not kill the plant. A plot in our Experimental Garden has survived a temperature of 25 degrees, and the plants have grown undisturbed for several years, filling the ground with tubers which are rather small because of the crowding and scant moisture in a heavy soil. Planted singly, and grown under more favorable conditions as to soil and moisture, great increase in size may be expected. The tubers should be set in rows about a foot apart. We will send a small package by mail for 10 cents.

JERUSALEM ARTICHOKES (*Helianthus tuberosus*). This old plant has recently received such high commendation from a few California growers that we offer tubers from our garden to others who may desire to experiment with it. We have grown Jerusalem artichokes for a number of years, and have produced the tubers at the rate of from one to two thousand bushels to the acre, according to the season. An interesting account of the growth and uses of the plant was given in our Report for 1884, copies of which can still be furnished to applicants. The following record of experience by Mr. F. P. Beverly of San Mateo county will indicate the adaptations and the uses of the tubers as stock feed:

"I planted the tubers on the driest part of the place, in a corner in my grain-field, in furrows about four inches deep, and obtained a crop of about 4000 pounds per acre. I, however, paid very little attention to them until last year, when I again planted about a pailful of tubers. This spring I secured enough to plant about two acres. I have been feeding them to my pigs and also to my cows, and I had to separate the cows from the larger pigs, as I had to watch them to keep them from fighting each other. The cows seem to relish them and my pigs never did so well. The beauty of the artichoke is, it can be left in the ground until the following spring and will keep well. The pigs will dig for themselves, and will do well with hardly any other feed."

When hogs are put upon the , field they will leave enough to produce a crop the following season. The ground can be cleared if desired by plowing out early in the growing season, when the young plants are about a foot high, as then the old tubers have rotted and new ones have not formed. Planting and cultivation should be the same as with potatoes, except that a single tuber is enough to a hill. We have two varieties—White French and Red Brazilian. The former is highly esteemed by some as a table vegetable either boiled or used in soups or salads. The red variety is perhaps superior for stock purposes. We can furnish both sorts if desired at 10 cents per package of each by mail.

FORAGE PLANTS.

Our Report for 1890, which will soon be ready for distribution, will contain much information concerning forage plants which we have previously distributed. The success therein attributed to some plants leads us to offer the seed for still wider distribution this year in

connection with other seed now offered for the first time.

A Waste Land Forage Plant, Elliott's Sida (*Sida Elliottii*).—The demand for plants which will catch and hold on upon the wild pastures of the State is constant. We have already introduced several which have won approval in some localities, but have failed in others. This year we offer seed of another, which may prove useful to some of our stock-growers. Our attention was called to this plant in 1889 by Hon. G. D. Tillman, M. C. from South Carolina, who has given much attention to the introduction and growth of forage plants, suited to his own State. His communication, Aug. 31, 1889, was as follows:

"I inclose some seed of a new plant, which made its appearance in my yard about three years ago. It is a number one pasture or green manure shrub or little bush, which grows spontaneously to a height of 18 inches to 2 feet. Cattle and hogs are very fond of it; horses and mules as yet do not seem to like it. The plant has a long tap root. I believe it will prove a godsend for your stock ranges in California, taking possession of all your waste places and wild lands. It seems to prefer hard clay or rocky land. It is also a wondefrul honey plant for bees. Just scatter the seed on the hills, and in a few years it will cover the whole surface. In the meantime pasturing does not hurt it, but the plant is worthless for either hay or soiling."

The seed received from Mr. Tillman was sown in our garden and germinated readily. Our botanist identifies the plant as *Sida Elliottii*. It is a member of the *Malvaceæ* or mallow family, which are all innocuous, mucilaginous and nutritive plants. *Lavatera*, which is our native California genus, is of good repute as a forage plant, and it is likely that this *Sida* will prove desirable in this State, as Mr. Tillman finds it in South Carolina. It grows finely in the heavy clay of our garden, and the plat which received no irrigation whatever looks more thrifty than another plat, which was moderately watered through the summer. It sends down a long tap root, and while young is quite leafy and succulent. It seeds freely and promises to extend itself, as Mr. Tillman describes. We do not apprehend that it would be difficult to kill out by cultivation, but we do not advise sowing the seed except on places designed for permanent pastures, and not on meadows designed for mowing. Scatter the seed, as Mr. Tillman advises, on hilly pastures, scratching it in here and there with a rake. Mark the places so that it can be looked for afterward. Seed will be sent by mail in small packages for 3c.

Texas Blue Grass (*Poa arachnifera*).—This grass can now be commended as especially valuable in many parts of the State. We furnish root-sets in 8-oz. packages for 8c. each by mail. By planting a small plot, the grower will soon have roots to plant a large area if the grass commends itself.

Other Forage Plants.—There is still demand for the forage plants which we have formerly distributed. Some of them have proved very successful and valuable, as is shown by our report of 1890. It is desirable to have as wide trial as possible of all of them:

Japanese Wheat grass (*Agropyrum japonicum*),
Tall Oat grass (*Arrhenatherum avenaceum*),
Schrader's Brome grass (*Bromus unioloides*),
Hungarian Brome grass (*Bromus inermis*),
Hairy-Flowered Paspalum (*Paspalum dilatatum*),
Millet grass (*Milium multiflorum*),
Snail clover (*Medicago turbinata*),
Esparcet or Sainfoin (*Onobrychis sativa*),
Jersey Kale—a tall-growing collard producing a vast weight of feed on moist land. Plants should be grown and set out like cabbages.

Each of the above will be sent by mail in 4 oz. packages at 5c for each kind ordered.

Anti-Gopher Plant (*Euphorbia Lathyris*).

There is periodical announcement that some one has secured immunity from gophers by the growth of a plant which is claimed to be potent in killing or banishing them. Each such announcement brings us a flood of correspondence as to the alleged efficacy of such a plant. We conceive that the best way to inform the public on this subject and to determine whether the plant has value as a "gopher-fuge," is to offer the seed to all who feel inclined to experiment with it.

Perhaps the first declaration of the existence and use of such a plant as a repellant of gophers was made by the late Gen. Vallejo at a meeting of the State Horticultural Society, in April, 1885. He said that he had, some time previously, received from Mexico the seed of a plant called "Cruz de Malta," and had sown it widely over his place in Sonoma valley, with the banishment of gophers as a result. At our request Gen. Vallejo sent some seed to the University and it was seen that the plant was the "Giant Spurge" or "False Caper" (*Euphorbia Lathyris*) known both in this country and Europe as an ornamental plant, its seed-vessels being used in Northern Europe for pickling instead of the true capers, the flower buds of *Capparis Spinosa*, which is not hardy enough to succeed in the higher European latitudes. The spurge has a milky juice, and is somewhat poisonous—serious sickness of children having been induced by eating the attractive berry-like seed capsules.

The name "Cross of Malta," which is sometimes given the plant, is derived from the rectangular arrangement of the leaves in the young plant. As it matures, laterals shoot forth from the axils of these leaves, which have a different foliation, and upon these laterals the bloom and fruit appear.

The point to be determined by the present distribution of the seeds of *Euphorbia Lathyris* is whether it has any influence in ridding its vicinity of gophers, either by poisoning them, as believed by Gen. Vallejo, or by driving them away, as others have conceived. Our own belief is that it has no effect in either direction. We have grown it in our economic garden for a decade or more, and still the gardener has not been able to relax any of his watchfulness for gophers. In fact they have been found at work quite near to the plants. Still, as has been stated above, almost every year the local papers announce some one's success with a "wonderful anti-gopher plant," and in every case we have followed up, it is the same "giant spurge," which is credited with the beneficent work. Our soil, however, is a stiff adobe, and cases of success with the plant have been mostly reported from regions with sandy soils. The seed should be treated as ordinary flower seed, sown in the open ground. We will send a small packet to each applicant by mail for 2c.

SUGAR CANE.

The success attained in the growth of sor-

ghum varieties for syrup manufacture, and the present prominence attaching to the beet-sugar industry in this State, have caused renewed inquiry concerning the possibility of producing the true sugar cane (*Saccharum officinarum*) in this State. Unquestionably, it will thrive in some parts of the State if proper soil and moisture conditions are secured. In order to determine these points, we have secured through Director Stubbs of the Louisiana Experiment Station, where special attention is being paid to the cane-sugar industry, cuttings of cane of a variety most likely to succeed in this State. These cuttings may be treated and planted as recommened for cassava cuttings above, using two or three joints to a cutting. As cane is heavy the charge will be 25c per package by mail.

CEREALS.

Although much interest is always manifested in the public exhibitions, which are occasionally made, of the large collections of cereals which are grown at our stations; there does not seem to be very wide disposition toward individual experimentation with new varieties. The grain crops of the State consist of a few varieties which have disclosed local adaptations and seem to satisfy the growers. It should, however, be borne in mind that cereals are being improved by crossing and by selection, and we desire to secure experimenters in different parts of the State to determine whether alleged improvements are locally valuable or not. We offer the following:

NEW FRENCH WHEATS.—Two French hybrids (1. Hybrid Dattel and 2. Hybrid Inured) were received last winter through the U. S. Department of Agriculture. They are good plump wheats, and are the result of crossing other varieties which possessed individual excellence either in straw or grain. Though (as we judge from the reports of Eastern stations of the crop of 1891) they do not seem to be well adapted for Eastern conditions, they may be valuable in this State, where conditions are more like those under which they were developed. As grown on the station grounds in Berkeley, they were quite satisfactory in growth and yield. We would like to have them more widely tried.

BERKELEY HYBRID BARLEY.—A chance hybrid which originated at this station, having a slender, leafy stem and beardless. Especially commended for hay.

RUST-PROOF OATS.—Two varieties obtained from Georgia. The "Heavy Winter" is commended to us as a heavy, tall oat which resists rust if sown early. "Mox Rust-Proof" very seldom shows any injury from rust, grows to medium height and is very productive. It is counted in Georgia as the "surest and only reliable spring oat."

Terms for Cereals.—Applicants for seeds of the cereals named above may order any one or all varieties—15c. for each variety in 1 lb. sacks, postage paid.

SHRUBS AND TREES.

Though the following have been included in previous distributions, the demand for them seems to be constant, and they are again offered:

Osier Willows.—Nine named Austrian varieties; sent in lots of 10 of a kind; 10c. per lot, or one dozen assorted, 20c. by mail.

English Oak (Quercus robur, var. pedunculata).—Of exceedingly rapid and satisfactory growth in California; commended for planting in most parts of the State, both upon lawns and in forest plantations. We send acorns, which should be planted at once where trees are desired and protected from birds, squirrels and other animals. Packages of acorns, 10c. each by mail.

Black Wattle (Acacia decurrens).—This tree has demonstrated its adaptation to most California climates, is a rapid grower and very desirable. The seed should be put in boiling water and allowed to stand and cool 12 hours before planting. Otherwise the seed may not germinate until the second year: 3c. per packet by mail.

Mulberries—Cuttings of the following kinds can be had: (1) Multicaulis; (2) Alba; (3) Russian; (4) Downing's Ever-bearing; (5) Lhoo; (6) Nagasaki. Sent in lots of 10 of a kind; 10c. per lot, or 12 cuttings assorted, 20c. by mail.

Resistant Grape Vines.—These vines are not desirable for fruit-bearing, but are offered to those desiring to test them as stocks for grafting. Cuttings of 13 species of *Vitis* can be had. Sent in lots of 10 of a kind; 10c. per lot, or a dozen assorted, 20c. by mail.

Fruit Tree Scions.—The University orchard contains upward of 500 named varieties of fruit, and our report on "Agricultural Experiment Stations," 1890, pages 182 to 187, contains a full list. This report will be sent to all applicants who may order any of the varieties named. We may not be able to supply all applications for some of the newer varieties, because the trees are small.

We do not furnish rooted trees, but scions, for grafting. We do not send large quantities of any variety, because the object is to test varieties and not to furnish material for commercial propagation. Send 10c. for each dozen ordered of a single kind, or 20c. if a dozen of assorted varieties is ordered.

FIBER PLANTS.

Ramie, ten plants	25c.
Cotton, 8-oz. seed	10c.
Jute, 4-oz. seed	5c.
Flax, 8-oz. seed	10c.
New Zealand flax, five plants	25c.*
Esparto grass, ten plants	25c.

*The plants are too large for mailing, and will be sent by express, charges to be paid by receiver; our charge is for packing.

VEGETABLES.

CEYLON PEA.—This variety of table peas was received by us from Ceylon; its true varietal name not being known to us. It has proved a very productive and desirable late pea, and is worthy of wide trial. Sent by mail; 4-oz. package, 5c.

Beans.—"Tall Mont d'Or," an excellent variety; 4-oz. packages, 5c.

Beets.—"Eclipse" and "Osborn," very early and excellent; 1-oz. packages, 3c.

Spinach.—New Zealand (*Tetragonia expansa*); described by Von Mueller as a good culinary herb and as useful for restraining drifting sands; growing even during severest heat and drouth. Seed in 1-oz. packets, 3c.

Carrot.—Yellow Imperial; 1-oz. package, 3c.

N. B.—All applications for seeds and plants should be made as early as possible. We expect to send out *seeds about January* 1, *and* PLANTS ABOUT FEBRUARY 1. All applications should be addressed to

E. J. WICKSON,
Berkeley, Cal.

December 10, 1891.